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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,517	01/06/2004	Yasuko Yoshida	118254	3345

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EXAMINER

DIRAMIO, JACQUELINE A

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1641

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/751,517	Applicant(s) YOSHIDA ET AL.	
	Examiner Jacqueline DiRamio	Art Unit 1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>4/26/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Claims

Applicant's amendments to claims 1 and 3 – 5 filed April 4, 2007, as well as the supplemental amendment to claim 1, cancellation of claims 19 – 31, and addition of new claim 32 filed April 26, 2007 are acknowledged.

Currently, claims 1 – 18 and 32 are pending and under examination.

Withdrawn Objections and Rejections

The previous objection to claim 1 is withdrawn in view of Applicant's amendments filed April 4, 2007.

The previous rejection of claim 3 under 35 U.S.C. 112, second paragraph, is withdrawn in view of Applicant's amendments filed April 4, 2007.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 has been amended to recite the phrase, "wherein the thick area is separate from the thin area," which is vague and indefinite because it is unclear whether

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the term "separate" means that the thin area and thick area represent two independent pieces or that the thin area and thick area are not overlapping.

Claim 1 has also been amended to include the term "plan view," which is vague and indefinite because it is unclear which view this term refers to. The specification describes Figures 1 – 6 as displaying the "lateral view" of the device, wherein Figure 3 also includes the "plain view" of the device (see Figures; and p10-11). Therefore, it is unclear if the term "plan view" was misspelled for the term "plain view," i.e. top view, or if "plan view" refers to the "lateral view" or cross-section view of the device.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4, 7, 8, 10, 11, 13, 14, 16, and 17 are rejected under 35

U.S.C. 102(e) as being anticipated by McGrew et al. (US 2006/0154248).

McGrew et al. teach a sensor array device (reactive chip) comprising array (capture) probes fixed on each of three or more vibratory elements (vibration areas) arranged on a substrate (support), the array probes being able to bind to a target analyte substance, wherein the substrate has a thin layer 412 (area) surrounded by a

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thick area 424 and the vibration-generating part is positioned at the thin layer and wherein the thick area represents a separate layer from the thin layer (see Figures 1, 4 and 16; paragraphs [0015]-[0019], [0083]-[0089], and [0091]; and claims 13-18).

With respect to Applicant's claim 2, each vibratory element has a vibration-generating part having a first electrode and a second electrode 404 between which a piezoelectric/electrostrictive element is sandwiched (see Figures 1, 4 and 16; paragraphs [0015]-[0019], [0083]-[0091] and [0117]; and claims 13-18).

With respect to Applicant's claim 4, the substrate (support) has a thin layer 412 (area) surrounded by a thick area 424 and has the vibration-generating part 408 on the upper surface of the thin layer (see Figures 4a-4e; and paragraphs [0083]-[0089]).

With respect to Applicant's claim 7, a lead wire 420 for one of the first and second electrodes 420 is employed in common (see Figures 1, 4 and 16; and paragraphs [0083]-[0089]).

With respect to Applicant's claims 8, 11, 14 and 17, the sensor includes a means, i.e. detector, for measuring the resonance frequency of the vibratory elements (see paragraphs [0016] and [0125]; and claim 13).

With respect to Applicant's claim 10, the array (capture) probes can be different on each vibratory element (see paragraph [0019]).

With respect to Applicant's claims 13 and 16, the sensor array can employ an arrangement of at least four vibratory elements in a matrix of $n \times m$ wherein n is 2 and m is 2, with the same or different array probes fixed in each vibratory element (see Figures 1, 4, and 16; paragraphs [0015]-[0019], and [0091]; and claims 13-18).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew et al. (US 2006/0154248) in view of Ebersole et al. (US 5,658,732).

The McGrew et al. reference, which was discussed in the 102(e) rejection above, fails to teach the coating of the surface wherein the array (capture) probes are fixed.

Ebersole et al. teach a biosensor detector and method for detecting biological targets using specific binding and a piezoelectric element. The biological targets are detected through the binding of the targets to specific surface capture reagents that are immobilized on the detector surface. The immobilization of the surface capture reagents can be accomplished through direct absorption, or through the use of a surface coating. The coating of the surface with some sort of "adhesion promoter," polymer layer or monolayer film serves to enhance the binding of the surface capture

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reagent, as well as promote greater coverage of the capture reagent through the use of higher surface area coatings (see Abstract; and column 15, lines 30-67; and column 16, lines 1-6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the sensor array of McGrew et al. the coating of the surface as taught by Ebersole et al. because Ebersole et al. teach the benefit of coating a detector surface when immobilizing surface capture reagents specific for a target analyte because the coating serves to enhance the binding of the surface capture reagent, as well as promote greater coverage of the capture reagent through the use of higher surface area coatings.

Claims 5 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew et al. (US 2006/0154248) in view of Takeuchi et al. (US 2003/0033700).

McGrew et al. further fail to teach the placement of the vibration-generating part on the lower surface of a thin area of the support or substrate, or that the thin area corresponds to a space within the thick area.

Takeuchi et al. teach an integrated piezoelectric/electrostrictive film type element comprising a substrate 1 and an operating section 5, wherein the operating section comprises an upper and lower electrode 2 and 4, and a piezoelectric/electrostrictive element 3 (see Figures 1-2). The substrate 1 is created to have a thin vibrating section 1a and a thick edge 1b, which together create a cavity 6, wherein the operating section 5 is placed either on the upper or lower surface of the thin vibrating section (see Figures

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2b and 4). The placement of the operating section on the upper or lower surface of the thin section of the substrate allows for the improvement of the operating characteristics of the operating section by obtaining a high response and large displacement of the piezoelectric/electrostrictive element (see paragraphs [0048]-[0050], [0108], [0109], [0117] and [0118]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the device of McGrew et al. the placement of the vibration-generating part on the upper or lower surface of a thin area of the substrate, wherein the thin area represents a space or cavity within the thick area, as taught by Takeuchi et al. because Takeuchi et al. teach the benefit of placing an operating section, i.e. vibration-generating part, of a piezoelectric/ electrostrictive element on the upper or lower surface of a thin section of the substrate in order to allow for improvement of the operating characteristics of the operating section by obtaining a high response and large displacement of the piezoelectric/electrostrictive element.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew et al. (US 2006/0154248) in view of Heller et al. (US 5,605,662).

McGrew et al. fail to teach that a lead wire for each of the first and second electrodes is independent from each other.

Heller et al. teach a microelectronic device that is designed and fabricated to carry out and control multi-step and multiplex molecular biological reactions in microscopic formats. The device includes a matrix of addressable microscopic

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locations on its surface, wherein each individual micro-location is able to electronically control and direct the transport and attachment of specific binding entities to itself. Each addressable location contains an underlying direct current (DC) micro-electrode supported by a substrate, wherein the micro-electrodes each contain their own independent lead wire (see Figure 3; Abstract; and column 5, lines 24-42; and column 6, lines 44-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the device of McGrew et al. the use of independent lead wires to the first and second electrodes as taught by Heller et al. because Heller et al. teach the benefit of creating a substrate with independent addressable microscopic locations, wherein each addressable location contains a DC micro-electrode supported by a substrate, in order to allow for each individual micro-location to be able to electronically control and direct the transport and attachment of specific binding entities to itself.

Claims 9, 12, 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew et al. (US 2006/0154248) in view of Thompson et al. (US 2003/0214200).

McGrew et al. teach the use of an alternating-current power source connected to the first and second electrodes (see paragraphs [0016], [0018], and [0089]), but fail to teach the additional connection of the electrodes to a direct-current power source.

Thompson et al. teach of sensors comprising a piezoresponsive material. The piezoelectric sensing element is preferably embodied as a thin strip, wherein the deflection of the strip caused by an applied force creates a voltage signal that is produced through two or more electrical contacts that are connected to the piezoelectric material. Such piezoelectric sensing elements are useful over a range of frequencies, ranging from near-zero frequencies associated with direct current, up to ultrasound frequencies associated with alternating-current (see paragraphs [0003]-[0007]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the device of McGrew et al. the connection of the electrodes to both alternating and direct-current power sources as taught by Thompson et al. because Thompson et al. teach that piezoelectric sensing elements are useful over a range of frequencies and therefore, in order to create near-zero frequencies a direct-current source is needed, and to create ultrasound frequencies, an alternating-current source is needed.

Conclusion

No claims are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacqueline DiRamio whose telephone number is 571-272-8785. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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